

REMARKS/ARGUMENTS

1. Claims 1, 3-5, 8-12, 17-18 are Patentable Over the Cited Art

The Examiner rejected claims 1, 3-5, 8-12, and 17-18 as obvious over Guha (U.S. Pub. No. 2002/0194324) and Ng (U.S. Patent Pub. No. 2004/0049565). Applicants traverse with respect to the amended claims.

Amended Claim 1 recites a method for managing a network providing Input/Output (I/O) paths between a plurality of host systems and storage volumes in storage systems, comprising: providing an application service connection definition for each of the I/O paths from a host to a storage volume; providing at least one service level guarantee definition indicating performance criteria to satisfy service requirements included in at least one service level agreement with at least one customer for network resources; associating each service level guarantee definition with at least one application service connection definition; gathering, by a virtualization controller mapping physical storage resources to virtual volumes in a virtualization layer, Input/Output (I/O) performance data for I/O requests transmitted through the I/O paths; transmitting, by the virtualization controller, the gathered performance data to a service level agreement server; determining, by the service level agreement server, performance data maintained for the application service connection for which the gathered performance data was received; updating, by the service level agreement server, the determined performance data with the performance data received from the virtualization controller; monitoring, by the service level agreement server, whether the performance data for application service connections indicating the I/O requests transmitted through the I/O paths satisfy the performance criteria indicated in the service level guarantee definition associated with the application service connection definitions for the I/O path; and transmitting, by the service level agreement server, commands to the virtualization controller to throttle I/O transmission over at least one connection in response to determining that the performance data for at least one application service connection for the connection does not satisfy the performance criteria.

Applicants amended claim 1 to recite that the service level agreement server determines performance data maintained for the application service connection for which the gathered performance data was received and updates the determined performance data with the

performance data received from the virtualization controller, and determining whether the performance data for application service connections indicating the I/O requests transmitted through the I/O paths satisfy the performance criteria. These added requirements are disclosed on at least paras. 25-28.

In the Final Office Action, the Examiner cited paras. 44, 45, 49, 57, 60, 62, and 69 of Guha with respect to the requirements of these claims. (Final Office Action, p. 3) Applicants traverse.

The cited para. 44 mentions that content requests are monitored by a Quality of Service (QoS) enforcer that tracks every content request to a file server. The cited para. 45 discusses a Quality of Service (QoS) enforcer that makes routing decisions to provide load balancing, based on a rule based system that associates a QoS policy, with content. Information on application servers and their loads are provided to the QoS enforcer. The cited para. 49 mentions that a rules table 32 contains a QoS policy for each address, such as a priority, response time, etc. A resource status contains information from content controller 36 indicating the status of the components. The cited para. 57 mentions service level agreement (SLA) information of an I/O rate, response time, etc. at which data is to be delivered. The cited paras. 60 and 62 discuss how a content controller uses content request information from the QoS enforcer captured at the entry point of data center to allocate or deallocate content storage. The cited para. 69 discusses how the QoS enforcer communicates with the content controller. The content controller maintains and controls metadata associated with content data. The combination of the QoS enforcer and content controller allow dynamic allocation of I/O resources based on I/O load. If the traffic increases, the content controller might create and allow access to replicate web content.

Although the cited Guha discusses how a QoS enforcer monitors performance and that a content controller operates as a management system, nowhere does the cited Guha teach or suggest the claim requirements that a virtualization controller, which maps physical storage resources to virtual volumes, gathers I/O performance data and transmits the gathered performance data to a service level agreement server. Further, the cited Guha does not teach that the service level agreement server determines performance data maintained for the application service connection for which the gathered performance data was received from a virtualization controller and updates the determined performance data with the performance data received from the virtualization controller. Yet further, the cited Guha does not teach that a service level

agreement server transmits commands to the virtualization controller to throttle I/O transmission over the I/O paths if the performance data for the requests does not satisfy the performance criteria. Instead, the cited Guha discusses how a QoS enforcer does load balancing and provides information to the content controller that the content controller uses to determine how to allocate I/O resources.

Further, although the cited Guha mentions that QoS enforcer sends traffic levels to the content controller, there is no teaching that the content controller determines whether the requests sent through the QoS enforcer satisfy a performance criteria and sends commands to the QoS enforcer to throttle I/O transaction if the performance criteria is not satisfied. Instead, the cited Guha mentions that the content controller may allocate or deallocate content storage in response to request information captured by the QoS enforcer. sends commands to the

The Examiner recognized that Guha fails to disclose a virtualization controller mapping physical storage resources to virtual volumes in a virtualization layer and cited Ng as teaching a virtualization controller. (Final Office Action, pg. 4) In the Advisory Action, the Examiner cited paras. 23 and 43 of Ng as disclosing a virtualization controller which can perform duties of I/O monitoring and providing flow control. Applicants traverse with respect to the amended claims.

Para. 23 of Ng mentions that aspects of measuring data access and data flow over a fiber channel switch may be designed into the firmware of a virtual storage exchange device. Para. 43 mentions that the virtual devices (VSX) collect information used for flow control, load balancing, operating the SAN, and to provide a required quality of service (QoS) under service level agreements.

Although the cited Ng discusses a virtualization device collecting information for flow control and for quality of service purposes, the Examiner has not cited any part of Ng or Guha that teaches or suggests that a virtualization controller transmits gathered performance data to a service level agreement server, which in turn then determines performance data maintained for the application service connection for which the gathered performance data was received and updates the determined performance data with the performance data received from the virtualization controller.

Further, the Examiner has not cited any part of the combination of Ng or Guha that teaches or suggests that the service level agreement server determines whether the performance

data for application service connections indicating satisfy the performance criteria and if so sends commands to the virtualization controller to throttle I/O transmission over at least one connection in response to determining that the performance data for at least one application service connection for the connection does not satisfy the performance criteria.

Instead, the cited Ng discusses how a virtualization controller gathers information to use for Quality of service and flow control and how a Quality of Service enforcer monitors performance to allow dynamic allocation of IO resources based on I/O load. There is no teaching that a virtualization controller and service level agreement server interact as claimed in either of the references.

Moreover, even if one combines Ng with Guha as the Examiner proposes, the proposed combination does not teach the specific claim requirements concerning a virtualization controller to gather performance data to transmit to a service level agreement server, where the service level agreement server updates application service connection information for which the performance data was received, determines whether application service connections satisfy performance criteria, and sends commands to the virtualization controller to throttle I/O transmission if the performance criteria is not satisfied. Instead, the combination yields a system where a QoS enforcer performs load balancing and makes routing decisions and communicates with a content controller that uses information from the QoS enforcer to allocate content storage (Guha) and where a virtualization controller may also collect information for quality of service and flow controller. However, the cited Ng and Guha do not teach or suggest that the virtualization controller and service level agreement interact as claimed to maintain a quality of service for different application service connections.

Accordingly, Applicants submit that amended claim 1 is patentable over the cited combination because the cited combination of Guha and Ng do not teach or suggest all the requirements of claim 1.

Claims 3-5, 8-12, 17, and 18 are patentable over the cited combination of Guha and Ng because they depend from claim 1, which is patentable over the cited art for the reasons discussed above, and the additional requirements of these claims in combination with the base claims provide further grounds of patentability over the cited art.

2. Claims 2 and 7 are Patentable Over the Cited Art

The Examiner rejected claims 2 and 7 as obvious (35 U.S.C. §103) over Guha in view of Ng and Bradley (U.S. Patent No. 7,082,463)

Applicants submit that these claims are patentable over the cited are because they depend from claim 1, which is patentable over the cited art for the reasons discussed above and the additional requirements of these claims in combination with the base and intervening claims provide further grounds of patentability over the cited art.

Conclusion

For all the above reasons, Applicant submits that the pending claims 1-15, 17, and 18 are patentable. Should any additional fees be required beyond those paid, please charge Deposit Account No. 09-0466.

The attorney of record invites the Examiner to contact him at (310) 553-7977 if the Examiner believes such contact would advance the prosecution of the case.

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